

# PATENT SPECIFICATION

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## COMPLETE SPECIFICATION

### New Porous Materials suitable for Use as Thermal and Acoustic Insulators and Process for their Manufacture

We, BUREAU D'ETUDES ET LABORATOIRES ANNEXES A L'INSTITUT MEURICE CHIMIE S.P.R.L., a Belgian Corporate Body, of 14a, rue Simonis, Brussels, Belgium, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the manufacture of light porous materials suitable for use for thermal and acoustic insulating purposes.

For the manufacture of building materials having a high resistance to crushing it is known to use very fine ashes called "flying ashes" which comprises the material deposited on the boiler tubes of coal-fired locomotive engines and similar apparatus. For this purpose these ashes were mixed and kneaded with lime and water, the mixture hardened by heat acquiring a resistance to crushing which exceeds 500 kgs. per square centimeter.

The present invention is based on observation of the fact that "fly ash", which is the ash derived from the combustion of pulverized coals, contains more or less large quantities of spherular ashes, i.e. ashes formed of very tiny hollow spheres of vitrified material. Such spherular ashes are not suitable, as such, for the manufacture of high mechanical resistance materials and, when they are present, they are usually crushed in the course of kneading with lime and water.

We have found that the great lightness of the spherular ashes, which is of the order of 0.3 to 0.9 apparent density, makes it possible to separate them from the still finer ashes of solid nature and higher density, that accompany them in the "fly ash", and that by incorporating

the spherular ashes in a binder without breaking them, materials are obtained whose insulating properties are surprising, both from the thermal and the acoustic point of view. Thus the process according to the present invention for the manufacture of light porous materials suitable for use for thermal and acoustic insulating purposes consists in subjecting "fly ash" derived from the combustion of pulverized coal to a separation process in order to separate the hollow spherular particles from the solid grains accompanying them in said "fly ash", and thereupon mixing a binder with the hollow spherular particles so obtained so as to agglomerate them into a mass adapted for moulding into coherent light materials. The spherular ashes are previously separated from the accompanying finer solid ashes accompanying them by any suitable separation process, such as washing, screening or electrostatic precipitation.

In order to obtain light insulating building materials, various different binders may be employed, e.g. when working in the cold, plaster which is suitable, for example, for lagging of heating and steam pipes. Use can also be made of very different kinds of mineral and organic binders, such as molasses, flour, dextrin, bentonite, kaolin and clays; these binders may also be used together.

The spherular particles of ash may, if required, be sorted into different categories for the purpose of obtaining products of definite densities, for which purpose there can be used separating liquids of different densities or streams of liquid at suitable speeds.

According to one embodiment of the invention, the spherular ashes are employed for the manufacture of bricks or other ceramic articles. In this case, it is advisable

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to subject the spherules to a preliminary heating or firing. There is thus produced a change in the material which particularly causes any internal stresses existing in the small spheres to disappear. This heating or firing may be carried out at about 400° C. to 800° C. with the occurrence of only a small amount of waste due to the breaking of small spheres. After heating the spherules may undergo a further washing for the purpose of removing those of them that are broken, whereupon the remaining unbroken spherular particles are mixed with the binder, and, after moulding, the product is subjected to firing.

By way of example, bricks may be obtained as follows:—

To 90 parts by weight of calcined and cooled spherules separated from "fly ash" there are added 9 parts of kaolin and 1 part of bentonite. 2% of molasses and 20 to 45 parts of water are then added and the mixture is moulded. The bricks are dried and may be calcined, without any special precautions, at a temperature of 900° C. to 1200° C. The bricks thus obtained are very light, their apparent density being of the order of 0.4 to 0.5 in many cases. Lower densities may be obtained by the addition to the spherules of wood charcoal, coal dust, coke, sawdust or other materials which are eliminated, at least partially, in the firing operation. By carrying out the firing at a higher temperature (1280° C. for example), products are obtained having a slightly lower apparent density but a great resistance to crushing.

What we claim is:—

1. A process for the manufacture of light porous materials suitable for use for insulating purposes, which consists in subjecting "fly ash" derived from the combustion of pulverized coal to a separation process in order to separate the hollow spherular particles from the solid grains accompanying them in said "fly ash", and thereupon mixing a binder with the hollow spherular particles so obtained so as to agglomerate them into a mass adapted for moulding into coherent light materials.

2. A process as claimed in claim 1, in which the spherular particles, before admixture with the binder, are sorted into different categories for the purpose of obtaining products of different densities.

3. A process as claimed in claim 1 or 2, in which the spherular particles obtained from the "fly ash" as a result of the separation process are subjected to a preliminary heat treatment in order to free them from internal stresses.

4. A process as claimed in claim 1, 2 or 3, in which the product obtained by mixing the spherular ashes with a binder is first moulded into the desired form and then baked.

5. Light porous materials having good thermal and acoustic insulating properties manufactured by a process as claimed in any of the preceding claims.

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